

Closing the Engineering Gender Gap: Viewers Like You

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Giselle Eng was a high school junior with a penchant for the performing arts when she first learned about auditions for a new children's television series to air nationwide on PBS. Her interest wavered, however, when she learned the focus of the new series: engineering. "I definitely had a lot of misconceptions about engineering," says Eng, who recently graduated from Boston Latin

High School. "I thought it was all technical and computers and programming. I never really imagined myself doing anything related to engineering."

Despite her misgivings, she went through with the audition, and eventually was selected from hundreds of high school students to appear in the first season of *Design Squad*, a new PBS reality series from Boston public broadcaster WGBH that follows two

teams of high-schoolers as they solve a series of engineering challenges.

Eng's initial hesitation about engineering is symptomatic of a longstanding problem in America's innovation-based economy: women pursue college degrees and professional jobs in engineering at much lower levels than men. According to the National Science Foundation, just 16 percent of the 2005 college

freshmen majoring in engineering were women, down from an unremarkable 20 percent a decade earlier.

What's behind this gender gap? A study published in the *Journal of Women and Minorities in Science and Engineering* found that girls are completing high school science and math courses at the same rate as boys: 94 percent of girls took biology (compared with 91 percent of boys), 64 percent took chemistry (57 percent for boys) and 26 percent studied physics (32 percent of boys). Yet despite similar rates of participation and achievement in high school science and math courses, young women continue to lag behind their male peers in pursuing degrees in many science, technology, engineering and math (STEM) fields.

Thea Sahr, who heads WGBH's Extraordinary Women in Engineering initiative aimed at changing the way high school girls view the engineering profession and the way the profession positions itself before this potential workforce, attributes the gender gap to perceptions. "Our research found that high school girls don't really have an understanding of what engineering is," says Sahr, whose team interviewed college-bound high school girls as well as science and math teachers, guidance counselors, college engineering students and engineers. "Among all the audiences involved in our research, we found that engineering was perceived to be a 'man's profession' and that there is little or no encouragement for girls to consider engineering."

Of particular note was the perception among high school girls and their teachers and counselors that engineering was a less "people-oriented" profession that had less direct impact on people's lives than other scientific fields such as medicine or biology. "Girls and their educators did not have a clear picture of engineering," Sahr says. "We learned they believe that, to be a successful engineer, you must be highly superior in both math and science, a message that does not resonate with them."

"We also were surprised to learn," she says, "that the engineering community is spreading this message, focusing on the process of becoming an engineer rather than the societal value and rewards of being an engineer."

Changing perceptions

Changing these perceptions is the focus of the Extraordinary Women in Engineering initiative. Working in collaboration with nearly 50 professional engineering associations, universities and corporations, WGBH is developing an extensive multimedia campaign emphasizing ways the engineering field helps improve people's lives.

Sponsored by the National Science Foundation and Northrop Grumman, the project is developing an interactive web site that will use streaming video portraits of successful female engineers to combat the misperceptions many girls have about the profession. Outreach materials will enable science and math teachers and school counselors to guide girls who may be interested in engineering. And resources for engineers will be used to launch a dialogue on the need to redefine the profession as a desirable career option for high school girls. The initiative will also give America's more than 1 million engineers new tools to reach out to high schools, teachers, counselors and high school girls to encourage interest in pursuing a degree in engineering.

On the national level, a flurry of STEM-related bills in Congress would provide everything from scholarships and loan forgiveness to tax incentives and teacher training grants aimed at encouraging students to pursue degrees and consider teaching in STEM fields.

Before tomorrow's high school students can start taking advantage of

such incentives, however, we must find new ways of engaging even younger students in math, science and engineering.

Public television reaches 98 percent of all U.S. households and is uniquely positioned to help create the STEM pipeline.

In the past year, WGBH has debuted three new television series that focus on STEM-related content: *Fetch!*, a reality/game show for kids ages 9 to 13 with a focus on math and science; *Curious George*, a half-hour animated series that uses the misadventures of everyone's favorite little monkey to teach preschoolers basic concepts in math, science and engineering; and *Design Squad*, with its focus on engineering.

The common thread running through these programs is the presentation of STEM content in unexpected and entertaining formats that engage and excite young viewers. "*Design Squad* is targeting 9- to 12-year-olds because we want to show them what engineering is really about—how creative and exciting it is—before they decide that math and science are 'boring,'" says senior executive producer Kate Taylor.

"Our target audience loves reality shows, so we've taken what's best about them—the competition, the intensity, the people you start to care about—and married it to serious content," adds executive producer Marisa Wolfsky. "Our goal is to break down negative stereotypes—that engineers are nerdy, or that it's too difficult, or for boys only—and expose young people, especially girls, to the idea that engineering is something they might want to consider as a career."

When male scientists marry and have children, their chances of landing tenure-track positions in the sciences increase, but when women do the same, their chances of moving up the academic ladder decrease, according to a study by economists Donna Ginther of the University of Kansas and Shulamit Kahn of Boston University. Having a child under age 5 lowers the probability of a tenure track appointment by 8 percent for women scientists. For more, download: http://www.nber.org/~sewp/Ginther_Kahn_revised8-06.pdf

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As New England develops a STEM agenda, public broadcasting should be an active partner in helping to spark a passion for the field among what is inarguably our region's most valuable resource: the boys—and girls—who will make up the STEM workforce of tomorrow.

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Colby-Sawyer is among New England colleges where the liberal arts curriculum has traditionally required only one course in math, and no academic major or minor in math is offered. Recently the New London, N.H., school received a three-year \$149,290 grant from the National Science Foundation to incorporate teaching of basic math and reasoning skills across its liberal arts curriculum. One of 100 programs funded under the NSF's Course, Curriculum and Laboratory Improvement program, the Colby-Sawyer initiative's goal is to ensure that students can routinely use basic math concepts and skills considered critical in an information-centered global society. For more, visit: <http://www.colby-sawyer.edu/news/nsf.html>